AMENDMENTS TO THE CLAIMS

The following listing of claims will replace all prior versions and listings of claims in the application.

LISTING OF CLAIMS

1. (Presently Amended) A porous glass composite material comprising a gel that comprises water and a polymeric network comprising an alkoxosilane derivative, the network having a group of alterable charge, a hydrophobic group and a hydrophilic group.

2. (Presently Amended) The porous glass composite material of claim [[32]]37, wherein the spacer comprises a domain selected from the group consisting of charged functional groups; hydrophobic groups; hydrophilic groups; and combinations thereof; wherein the domain comprises a moiety selected from a group consisting of –S, -N, -N=N-, halogen, -OR, -R-O-R, -HOOCR, -HOR wherein R is hydrogen, unsubstituted branched and unbranched C_{1-20}-alkyls, substituted branched and unbranched C_{1-20}-alkyls, unsubstituted branched and unbranched ~~C_{1-20}-alkyls~~ C_{1-20}-alkenyls, substituted branched and unbranched C_{1-20}-alkenyls, unsubstituted branched and unbranched C_{1-20}-alkynyls, substituted branched and unbranched C_{1-20}-alkynyls, substituted, unsubstituted, and multiple ring aryl groups, and wherein R is the same or different; and combinations thereof.

3. (Presently Amended) The porous glass composite material of claim 2, wherein the spacer is selected from the group consisting of $RHN(CH_2)_2NHR$, RNHR, and RNHCONHR, wherein R is hydrogen, unsubstituted branched and unbranched C_{1-20}-alkyls, substituted branched and unbranched C_{1-20}-alkyls, unsubstituted branched and

unbranched ~~C_{1-20}-alkyls~~ C_{1-20}-alkenyls, substituted branched and unbranched ~~C_{1-20}-alkyls~~ C_{1-20}-alkenyls, substituted, unsubstituted, and multiple ring aryl groups, and wherein R is the same or different.

4. (Original) The porous glass composite materials of claim 37, where R^1 is selected from the group consisting of n-$(CH_2)_2CH_3$, n-$(CH_2)_3CH_3$, -$CH(CH_3)_2$, -$CH_2CH(CH_3)_2$, -$CH(CH_3)CH_2CH_3$, -$CH_2CH(CH_3)_2$, -$CH(CH_3)CH_2CH_3$, OPh, -CH_2CH_2OH, -$CH_2CH_2OCH_3$, n-$CH_2(CH_2)_{16}$-CH_3, n-$O(CH_2)_3CH_3$, $OCH(CH_3)_2$, $OCH(CH_3)_2$, $OCH_2CH(CH_3)_2$, $OCH(CH_3)CH_2CH_3$, OCH_2CH_2OH and $OCH_2CH_2OCH_3$.

5. (Original) The porous glass composite material of claim 37, wherein R^2 is selected from the group consisting of n-$(CH_2)_2CH_3$, n-$(CH_2)_3CH_3$, -$CH(CH_3)_2$, -$CH_2CH(CH_3)_2$, -$CH(CH_3)CH_2CH_3$, -$CH_2CH(CH_3)_2$, -$CH(CH_3)CH_2CH_3$, OPh, -CH_2CH_2OH, -$CH_2CH_2OCH_3$, n-$CH_2(CH_2)_{16}$-CH_3, n-$O(CH_2)_3CH_3$, $OCH(CH_3)_2$, $OCH(CH_3)_2$, $OCH_2CH(CH_3)_2$, $OCH(CH_3)CH_2CH_3$, OCH_2CH_2OH and $OCH_2CH_2OCH_3$.

6. (Presently Amended) The porous glass composite material of claim [[32]] 37, further comprising a catalyst that is an acid catalyst or a base catalyst.

7. (Original) The porous glass composite material of claim 6, wherein the catalyst is selected from the group consisting of HCl, HNO_3, H_2SO_4, $HClO_4$, NaOH, KOH, NH_4OH, NH_3, NH_2OH, C_5H_5N, $C_6H_5NH_2$, and combinations thereof.

8. (Presently Amended) The porous glass composite material of claim [[32]] 37, further comprising, entrained within the gel, an additive for imparting to the glass composite material a desired functional property.

9. (Original) The porous glass composite material of claim 8, comprising, entrained within the gel, two or more additives for imparting to the glass composite material a desired functional property.

10. (Presently Amended) The porous glass composite material of claim 8, wherein the additive is an alkoxosilane precursor having the general formula $R_nSi(OR)_{4-n}$, wherein R is the same or different and is hydrogen, unsubstituted branched and unbranched C_{1-20}-alkyl, substituted branched and unbranched C_{1-20}-alkyl, unsubstituted, branched and unbranched ~~C_{1-20}-alkyl~~ C_{1-20}-alkenyl, substituted branched and unbranched ~~C_{1-20}-alkyl~~ C_{1-20}-alkenyl, unsubstituted branched and unbranched ~~C_{1-20}-alkyl~~ C_{1-20}-alkynyl, substituted branched and unbranched C_{1-20}-alkynyl, or substituted, unsubstituted, and multiple ring aryl group, and n=1 to 3.

11. (Original) The porous glass composite material of claim 8, wherein the additive is an alkoxosilane precursor selected from the group consisting of

$(OR)_3Si\text{-}CH_2CH_2CH_2NHCH_2CH_2NH_2$; $(OR)_3Si\text{-}H_2CH_2C_6H_4CH_2NHCH_2CH_2NH_2$;

$(OR)_3Si\text{-}R$; $(OR)_3Si\text{-}CH_2(CH_2)_{16}CH_3$; $(OR)_2Si\text{-}(R)_2$;

$(OR)_3Si\text{-}CH_2CH_2CH_2NHCH_2CH_2NH_2$;

$(OR)_3Si\text{-}CH_2CH_2CH_2N((COO\text{-}Na+)CH_2CH_2N(COO\text{-}Na+)_2$;

$(OR)_3Si\text{-}CH_2CH_2CH_2SH$; $(OR)_3Si\text{-}CH_2CH_2CH_2OCH_2CH_2OCH_2$;

$(OR)_3Si\text{-}CH_2CH_2C_5H_4N$; $(OR)_3Si\text{-}CH_2CH_2CH_2NCO$;

$(OR)_3Si\text{-}CH_2CH_2CH_2COOR$; $(OR)_3Si\text{-}ROH$; $(OR)_3Si\text{-}RCOOH$; $(OR)_3Si\text{-}RCHO$;

$(OR)_3Si\text{-}RCOR$; $(OR)_3Si\text{-}CH_2C1$; $(OR)_3Si\text{-}CH_2CH_2CH_2C_6H_{12}O_5CONH$;

$(OR)_3Si\text{-}CH_2CH_2C_5H_4S$; $(OR)Si\text{-}CH_2CH_2C_5H_3O$; and $(OR)_3Si\text{-}(CH_2)_nX$ wherein

X = -F, -Cl, -Br or –I and n = 1 to 20, and wherein R is hydrogen, unsubstituted branched and unbranched C_{1-20}-alkyl, substituted branched and unbranched C_{1-20}-alkyl, unsubstituted branched and unbranched C_{1-20}-alkenyl, substituted branched and unbranched ~~C_{1-20}-alkyl~~ C_{1-20}-alkenyl, substituted, unsubstituted, and multiple ring aryl groups, and wherein R is the same or different.

12. (Original) The porous glass composite material of claim 8, wherein the additive is selected from the group consisting of photoactive molecules, photoresponsive molecules, dyes, negatively charged polymers, positively charged polymers, metal ions or complexes thereof, redox-active molecules, biologically active molecules, biologically derived molecules and combinations thereof.

13. (Original) The porous glass composite material of claim 12, wherein the biologically active molecules are selected from the group consisting of carbohydrates, proteins, enzymes, peptides, nucleotides, DNA, RNA, cellular components and combinations thereof.

14. (Original) The porous glass composite molecule of claim 13, wherein the carbohydrate is selected from the group consisting of monosaccharides, disaccharides, polysaccharides and combinations thereof.

15. (Original) The porous glass composite molecule of claim 12, wherein the additive is a photoactive spiropyran molecule.

16. (Original) The porous glass composite molecule of claim 15, wherein the photoactive spiropyran molecule is 1'(2-carboxyethyl)-6-nitroBIPS.

17. (Original) The porous glass composite molecule of claim 12, wherein the additive is a photoresponsive molecule selected from the group consisting of flavin

mononucleotide (FMN), ß-nicotinamide adenine dinucleotide reduced form (NADH), bacteriorhodopsin, 8-hydroxy-1,3,6-pyrenetrisulfonic acid trisodium salt, luminol (5-amino-2,3-dihydro-1,4-phthalazonedione), bis-N-methylacridinium nitrate (N,N' – dimethyl-9,9'biacridinium dinitrate), flurorescein or its sodium salt ($C_{20}H_{12}O_5$ and/or $C_{20}H_{10}O_5Na_2$), and combinations thereof.

18. (Original) The porous glass composite material of claim 12, wherein the metal ion is a transition metal ion.

19. (Original) The porous glass composite material of claim 18, wherein the metal ion is a transition metal ion.

20. (Original) The porous glass composite material of claim 12, wherein the additive is selected from the group consisting of a polymer poly(acrylic acid), a polymer poly(itaconic acid), a polymer poly(ethylene glycol) and combinations thereof.

21. (Presently Amended) A separation medium comprising the porous glass composite of material claim [[32]] 37 affixed to a solid support.

22. (Original) The separation medium of claim 21, wherein the medium is a chromatographic separation medium.

23. (Presently Amended) A delivery vehicle for a bioactive agent comprising the porous glass composite material of claim [[32]] 37 in a biologically compatible form and wherein the porous glass material composite further comprises a bioactive material entrapped within the network.

24. (Original) The delivery vehicle of claim 23, wherein the bioactive material is a drug.

25. (Original) The delivery vehicle of claim 23, wherein the vehicle is adapted for controlled release of the bioactive agent.

26. (Original) A biocatalyst comprising the porous glass composite material of claim 1 and an enzyme.

27. (Presently Amended) A sensor for use in detecting a predetermined variable, the sensor comprising the porous glass composite material of claim [[32]] 37 exposed to an environmental stimulus associated with the predetermined variable.

28. (Original) The sensor of claim 27, wherein the environmental stimulus is selected from the group consisting of light, heat, pH change, exposure to a metal ion, electron transfer and combinations thereof, and the predetermined variable is selected from the group consisting of temperature change, optical change, pH change, presence of a metal ion, presence of a biomolecule and combinations thereof.

29. (Presently Amended) An actuator device comprising the porous glass composite of claim [[32]] 37 and a prime mover operatively positioned herewith.

30. (Original) The actuator device of claim 29, wherein the porous glass composite material is adapted to move the prime mover in response to a mechanical stimulus.

31. (Original) The actuator device of claim 29, wherein the porous glass composite material is adapted to move the primer in response to an electrical stimulus.

32. (Presently Amended) The porous glass composite material of claim [[27]] 37, wherein the group of alterable change, the hydrophobic group of the hydrophilic group are each part of the alkoxosilane derivative.

33. (Original) A porous glass composite material as set forth in claim 37 wherein the spacer corresponds to a formula selected from a group consisting of

$-[(CH_2)_3NH(CH_2)_2NH(CH_2)_3-$.

34. (Original) A porous glass composite material as set forth in claim 37 wherein the spacer corresponds to a formula selected from the group consisting of

$-[(CH_2)_3NH(CH_2)_3]-$.

35. (Original) A porous glass composite material as set forth in claim 37 wherein the spacer corresponds to a formula selected from a group consisting of

$-[CH_2CH_2CH_2NHCONHCH_2CH_2CH_2]-$.

36. (Original) A porous glass composite material as set forth in claim 37 wherein the spacer corresponds to a formula selected from the group consisting of

$-OC_6H_4N=NC_6H_4O-$.

37. (Amended) The porous glass composite material of claim 1, wherein the alkoxosilane derivative is a derivative of an alkoxosilane having the general formula $(OR^1)_3Si$-spacer-$Si(OR^2)_3$, wherein R^1 and R^2 are the same [[of]] <u>or</u> different and are selected from the group consisting of hydrogen, unsubstituted branched and unbranched C_{1-20}alkyls, substituted branched and unbranched C_{1-20}alkyls, unsubstituted branched and unbranched C_{1-20}alkenyls, <u>substituted branched and unbranched C_{1-20}alkenyls</u>, unsubstituted branched and unbranched C_{1-20}alkynlys, substituted branched and unbranched C_{1-20}alkynyls, substituted, unsubstituted, and multiple ring aryl groups, and combinations thereof.